

1A Voice Storage System:

Voice Storage in the Network—Perspective and History

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In mid-1976, Bell Laboratories undertook development of the then radical concept of introducing new customer services via a voice-storage capability in the network. With four systems installed and ready for service, the project was terminated in October, 1981, as a result of Federal Communications Commission (FCC) actions stemming from the Computer Inquiry II decisions declaring voice storage to be an enhanced service that could not be offered by the regulated network.

The following five papers, describing the services, architecture, and technology of the 1A Voice Storage System (vss) implementation of this Custom Calling Services (ccs) II offering were written two years ago and held until the regulatory outcome was settled. This brief introduction is intended to provide some background and perspective on the intervening time period.

The basic design concepts behind the ccs II offering and its associated 1A vss serving vehicle can be categorized into four major elements:

(i) Provision of a new class of flexible stored program controlled customer services involving storage, for later delivery, of the customer's voice messages under either called party control (Call Answering services) or calling party control (Advance Calling services)—to be known collectively as Custom Calling Services II. The design of ccs II included careful attention to interaction with previously existing ESS-based services (Custom Calling Services I) and to software flexibility of feature definitions, as has historically been the case in other stored program controlled systems.

(ii) For widespread availability and easy deployment, and for minimum costs, a system configuration consisting of shared voice storage nodes, each subtending multiple local ESS offices via dedicated trunk groups to provide access for customers. Appropriate traffic engineering allows for rapid changes to meet changing demand needs and forecasts.

(iii) Extensive use of digital technology to assure optimum opportunity to ride the silicon learning curve, including disk storage for digitally encoded speech, stored program control with distributed peripheral microprocessors, and the use of coder/decoders (CODECS), digital buffering, and custom large-scale integration (LSI) at the interfaces.

(iv) Emphasis on overall integrated network operation between the ESS and 1A VSS entities, including a formalized signaling plan, joint operation on billing functions and service orders, and the use of a common operations support system network.

Based on these concepts, the 1A VSS was designed and programmed for providing CCS II as described in the five papers that follow. The first system was installed in Philadelphia, Pennsylvania, and the first calls were processed there in early 1979. Initial experiments indicated that the human factors aspects of the design (customer interaction and perception of the services) were generally good and required only very minor changes. However, the reliability of the service, in terms of lost calls and integrity of the long-term voice message database, was below expectations, as was the total throughput capability of the centralized VSS. During 1979, required software changes were undertaken and retested and three additional systems were installed in New York, Dallas, and Chicago. In March, 1980, full-time (24 hours a day) "friendly user" service was established with the Philadelphia 1A VSS, starting with 35 Bell of Pennsylvania employees using the service from their residence phones, and subsequently progressing to 150 employees. Similar friendly user service was also initiated at other sites with the largest activity taking place at the Dallas site where friendly users numbered 450 people by late 1980.

As a result of these successful tests, a tariff was filed for the Philadelphia offering with the Pennsylvania Public Utility Commission (PUC) in May, 1980, for planned July, 1980, service. Plans were made for filing tariffs for the other sites shortly thereafter. The tariff was not approved by the PUC because of a pending antitrust suit filed by the Associated Telephone Answering Exchanges, Inc. (ATAE) and related PUC proceedings. Viability of the service offering was further complicated by the uncertainty created by the May, 1980, FCC order under its Second Computer Inquiry findings that enhanced services encompassed the area of voice storage, which could therefore not be offered as part of the regulated telephone network.

By early December, 1980, the Pennsylvania PUC's Administrative Law Judge recommended rejection of the AT&T position, but service continued to be deferred because of FCC rulings. A late December, 1980, FCC order specifically reaffirmed the earlier definition of voice storage as an enhanced service, but provided AT&T the option of requesting waivers under certain circumstances. The Bell System filed such a petition for waiver for CCS II in March, 1981. During the intervening period, all four systems continued to provide friendly user services to Bell System employees, and considerable data on customer reaction and system performance continued to be recorded.

In October, 1981, the FCC rejected AT&T's petition for waiver to allow the offering of CCS II as part of a regulated network service. At that point, the offering was withdrawn and the project terminated. At the time of the withdrawal of the service, measured data at the four sites and on laboratory support monitoring equipment indicated that the system met or exceeded all of its original design requirements on customer machine interactions, maintainability, reliability, and throughput.

The following five papers document the architecture of the service and of the serving vehicle. The confluence of these customer needs with the rapid progress in voice-storage technology will undoubtedly result in numerous future applications.

